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EXAMINER	
IBRAHIM, MEDINA AHMED	
ART UNIT	**PAPER NUMBER**
1638	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/031,331	YAMADA ET AL	
	Examiner	Art Unit	
	Medina A Ibrahim	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-125* is/are pending in the application.

4a) Of the above claim(s) *1-7,13-63,70-110,119 and 120* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *8-12,64-69,111-118 and 121-125* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01/18/02* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Group II and SEQ ID NO: 39 encoding SEQ ID NO: 40, in the reply filed on 07/04/04 is acknowledged. The traversal is on the ground(s) that , according to Applicant, it is impossible to elect one of Groups I-IV and one nucleic acid sequence and its encoded protein because the encoded protein is in a separate group. Applicant requests the co examination of the elected Group II drawn to SEQ ID NO: 39, with the Group III, drawn to SEQ ID NO: 40. This is not found persuasive because the lack of unity between DNA sequence and its encoded protein as set forth in the Office action is proper. Applicant has elected Group II, drawn to a DNA sequence, a vector, a plant comprising the DNA and a method for using said DNA. For the election of Group II, Applicant was also required to elect one DNA sequence and its encoded protein. Applicant has elected SEQ ID NO: 39 encoding SEQ ID NO: 40. However, claims directed to the isolated protein encoded by the elected DNA cannot be examined together with the DNA because there is no special technical feature that links the DNA and the protein. For example, the DNA of claims 8-12 does not necessarily encode SEQ ID NO: 40 or the proteins as listed in claim 64. In addition, the special technical feature of Group II not recited in Group III is the nucleic acid sequences, expression vectors, and plants comprising said nucleic acid sequences, and a method of using said nucleic acid sequences. Therefore, Applicant's arguments are not persuasive. The requirement is still deemed proper and is therefore made FINAL.

Claims 1-125 are pending.

Claims 1-7, 13-63, 70-110, and 119-120 are withdrawn from considerations as being directed to non-elected inventions. Note, claims directed to non-elected DNA sequences will not be examined.

Claims 8-12, 64-69, 111-118, 121-125 are under consideration.

Sequence Listing

Applicant's CRF and paper sequence listing filed 20 November 2003 have been entered. However, this application fails to comply with the requirements of 37 CFR 1.821-1.825 because the sequence listings of Fig. 9 have not been identified by SEQ ID NO: in the Description of the Drawings on page 18 of the specification. Applicant is respectfully requested to identify the sequences in Fig. 9 or to submit a new Sequence Listing that comprises said sequence.

Claim Objections

At claims 8-12, "DNA encoding proteins" lacks proper article. An amendment to ---- An isolated--- before the DNA would obviate the objection

At claim 12, the plant species listed should be in italics.

Claims 64-65 are objected to for containing more than one period. The claims should also be amended to insert ---isolated--- before " DNA".

At claims 115-116, "host" should be inserted before "cell".

Specification

The disclosure is objected to because of the following informalities: pages 6-17 refer to the specific claim numbers. The specification cannot refer to specific claim numbers. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8-12, 64-69, 111-118, 121-125 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 8-12, 111, and 118 are indefinite for depending upon a non-elected invention. The claims are considered to contain all limitations of the parent claims, in the interest of compact prosecution.

"DNA encoding proteins" at claims 8-12, 111, 118-119 and "a DNA encoding proteins" at claim 66, imply a single DNA encoding multiple proteins that does not make sense. The specification fails to shed light on such DNA, and thus one would know what is encompassed by the claims. Appropriate correction is required to more clearly define the metes and bounds of the claims.

Claim 66 is indefinite for failing to recite the specific hybridization and wash conditions required for Applicant's "stringent conditions". There are several different ways to define "stringent", and the instant specification fails to clearly define the desired stringent.

Claim 67 is indefinite in the recitation of "used" without reciting the steps for using the desired DNA, which one can follow to carry out the claimed method. Appropriate correction is required to clearly point out the metes and bounds of the claims.

At claims 118 and 121-122, dividing, proliferating and redifferentiating a plant cell do not necessarily produce a plant. If applicant intends ---regenerating a plant from the plant cell ---, the claims should be amended to recite as such.

At claim 125, what "a material for breeding derived" encompasses is unclear. The claim reads as if the material is not a transgenic plant material. This does not appear to be Applicant's intention. If Applicant intents " transgenic plant part" or "transgenic seed" from the transgenic plant of claim 121, the claims should be amended to recite as such.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 8-12, 64-69, 111-118, 121-125 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the isolated DNA of SEQ ID NO: 1 encoding a protein that confers tolerance against environmental stresses, a vector and transgenic plant comprising said DNA, and a method of transforming plant/plant cell with said vector does not reasonably provide enablement for any DNA encoding proteins having the activity of improving environmental stresses. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

The claims are broadly drawn to DNA obtained by specified process, the DNA encoding proteins having the activity of improving environmental stress tolerance, including salt stress, high and low temperature stresses, drought stress, ozone stress, UV stress, radiation stress and osmotic stress. The claims are also drawn to said DNA isolated from plants including specific plant species. The claims are further drawn to DNA sequences that hybridize to SEQ ID NO: 39, a part of SEQ ID NO: 39, DNA encoding proteins with one or more amino acids deleted, substituted or added in SEQ ID NO: 40, vectors and host cells, and plants comprising said DNA sequences, and progeny or breeding material of the transgenic plants. The claims are also drawn to a method of using said DNA.

Applicant teaches isolating DNA sequences from cDNA library prepared from halophytes *Bruguiera Sexangla, Mesembryanthemum crystallinum, Sueada japonica, Avicennia marina, and Salsola Komarovii* plant tissues, said DNA sequences encoding proteins having activities of improving salt stress tolerance in plants (Examples 1-2). At Example 3, Applicant teaches screening of cDNAs for salt tolerance. Applicant also teaches that SEQ ID NO: 39 encoding SEQ ID NO: 40 is from Sueada japonica, and teaches that SEQ ID NO: 40 has 86% homology with phosphoethanolamine N-methyltransferase (gp AF237633 1) of *Spinacia oleracea*, therefore is expected to possess the activity of improving stress tolerance in transgenic plants. Applicant also teaches construction of vectors comprising said DNA sequences for plant transformation, and a method for preparing recombinant proteins using said DNA sequences. At Example 4, Applicant teaches effects of SEQ ID NO: 1 encoding SEQ ID

NO: 2 against heat, freezing and osmotic stresses in tobacco cells/plants. Applicant further teaches methods for evaluating proteins having salt tolerance (Figure 9).

Applicant has not provided guidance for how to identify and obtain the DNA of the invention as broadly claimed. Applicant has not taught the obtention of all DNA sequences encoding proteins having the activity of improving all environmental stresses, nor that Applicant teaches a method of using said DNA to improve stress tolerance in transgenic plants. The scope of the claims encompass all DNA from various natural sources encoding proteins having the activity of improving all environmental stresses including thermal, freezing, osmotic pressure, salt, drought, or ultraviolet. However, Applicant has not provided guidance for a method that would enable one the specific isolation of all these various DNAs encoding proteins of a various structural and functional characteristics.

The state of the art for isolating DNA sequences with specified function is highly unpredictable. At page 3 of the specification, the last sentence of the first full paragraph, Applicant states "....., there is no established technology for isolating effectively a group of genes encoding proteins having the activity of improving tolerance to salt stress, and at the present situation, the environmental stress tolerant genes in many halophytes such as a group of mangrove plants have not been studied well enough". Therefore, one skilled in the art would require substantial guidance with respect to hybridization/ and wash conditions that would allow the specific isolation of the target DNA sequences. In the absence of such guidance, one skilled in the art has to proceed with trial and error experimentation to screen through the vast number of cDNA and genomic

clones to identify those nucleic acids encoding proteins having the desired functional activity, and to evaluate the ability of each of said DNA to affect resistance to different environmental stresses in a transgenic plant. In addition, while several genes encoding proteins that confer tolerance to water deficit and salt stress have been studied, little is known with regard to the underlying molecular mechanism for the tolerance (see WO 00/00601; paragraph bridging pages 1 and 2).

With respect to claims 64-66, drawn to DNA hybridizing to SEQ ID NO: 39 or a part thereof and DNA encoding modified proteins, Applicant has not provided guidance for hybridization conditions that would allow the recovery of the target DNAs from various natural sources; nor that Applicant has taught DNA encoding proteins with one or more amino acids deleted, substituted or added the exemplified or non-exemplified DNA while retaining the stress tolerance activity. In addition, since SEQ ID NO: 39/40 is a partial DNA/protein sequence and has not been shown to possess the desired activity, modified sequences thereof are not expected to possess the desired activity as recited in the claims.

While mutagenesis techniques are known, it is not routine in the art to screen for multiple substitutions or multiple modifications as encompassed by the instant claims. One skilled in the art would expect any tolerance to modification for a given DNA/protein to diminish with each further and additional modification or multiple substitutions/ deletions. One skilled in the art would have to make all possible amino acid substitutions, additions and deletions in the 473 long amino acid sequence of SEQ ID NO: 40 or the 1602 long nucleotide sequence of SEQ ID NO: 39, and test all sequences

that meets the structural limitations to determine which also meet the functional limitation.

Therefore, given the lack of sufficient guidance in the specification; the limited working examples; the nature of the invention; the state of the art and unpredictability as discussed above, the claimed invention is not enabled throughout the broad scope. See, *In re Wands (858F.2d 731, 8 USPQ2d 1400 (Fed. Cir. 1988).* See also *In re Fischer, 166 USPQ 19 24 (CCPA 1970)* where the court held the scope of the claims must bear a reasonable correlation with the scope of the enablement.

Written Description

Claims 8-12, 64-69, 111-118, 121-125 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims are broadly drawn to DNA obtained by specified process encoding proteins having the activity of improving environmental stress tolerance, including salt stress, high and low temperature stresses, drought stress, ozone stress, UV stress, radiation stress and osmotic stress. The claims are also drawn to said DNA isolated from plants including specific plant species. The claims are further drawn to DNA sequences that hybridizes to SEQ ID NO: 39, DNA encoding proteins with one or more amino acids deleted, substituted or added in SEQ ID NO: 40, vectors and host cells comprising said DNA sequences, and transgenic plants. The claims are also drawn to a

method of using said DNA. In contrast, Applicant describes SEQ ID NO: 1 encoding SEQ ID NO: 2, and sequences from other halophytes. It is noted that SEQ ID NO: 39 is a partial DNA (not an open reading frame) encoding a partial protein, and therefore, the ability of SEQ ID NO: 39 encoding SEQ ID NO: 40 to confer environmental stress tolerance is uncertain. Therefore, the written description requirements of SEQ ID NO: 39 have not been satisfied. Applicant has not described a representative number of DNA encoding proteins having the activity of improving tolerance to environmental stresses. These are genus claims.

In *Eli Lilly and Co.* 43 USPQ2d 1398 (Fed. Cir. 1997), the court stated:

An adequate written description of a DNA "requires a precise definition, such as by structure, formula, chemical name, or physical properties", not a mere wish or plan for obtaining the claimed chemical invention... Accordingly, "an adequate written description of a DNA requires more than a mere statement that it is part of the invention and reference to a potential method of isolating it; what is required is a description of the DNA itself (43 USPQ2d at 1404).

The court held that held that human insulin-encoding cDNA is not described by prophetic example, which sets forth only a general method for obtaining the human cDNA:

The name cDNA is not itself a written description of that DNA; it conveys no distinguishing information concerning its identity...Describing a method of preparing a cDNA or even describing the protein that the cDNA encodes...does not necessarily describe the DNA itself. No sequence information indicating which nucleotides constitute human cDNA appears in the patent, as appears for rat cDNA....Accordingly, the specification does not provide a written description of human cDNA (43 USPQ2d at 1405).

The description of a single species of rat cDNA was held insufficient to describe the broad genera of vertebrate or mammalian insulin:

"In claims to genetic material...a generic statement such as 'vertebrate insulin cDNA' or 'mammalian insulin cDNA', without more, is not an adequate written description of the genus because it does not distinguish the claimed genus from others, except by function. It does not specifically define any of the genes that fall within its

definition. It doesn't define any structural features commonly possessed by members of the genus that distinguish them from others. One skilled in the art therefore cannot, as one can do with a fully described genus, visualize or recognize the identity of the members of the genus. A definition by function...does not suffice to define the genus because it is only an indication of what the gene does, rather than what it is (43 USPQ2d at 1406).

The court continued:

"Thus...a cDNA is not defined by the mere name 'cDNA', even if accompanied by the name of the protein that it encodes, but requires a kind of specificity usually achieved by means of the recitation of the sequence of nucleotides that make up the cDNA...A description of a genus of cDNAs may be achieved by means of a recitation of a representative number of cDNAs, defined by nucleotide sequence, falling within the scope of the genus or of a recitation of structural features common to members of the genus, which features constitute a substantial portion of the genus". (43 USPQ2d at 1406). See also where the court teaches that the disclosure of a process for obtaining cDNA from a particular organism and the description of the encoded protein fail to provide an adequate written description of the actual cDNA from the organism which would encode the protein from that organism, despite the disclosure of a cDNA encoding that protein from another organism.

Applicant has not described the composition and structure of all DNA encoding proteins having the activity of improving environmental tolerance in plants. The DNA of claims 8-12 are only described in that it encodes a protein having the activity of improving environmental tolerance in plants and its source as in claim 11-12. Applicant has not described core structural elements common to all DNA encoding proteins having the activity of improving environmental tolerance in plants; nor that such structural elements are well known in the art, according to a literature review. In addition, substantial variation in structures and function are expected among the DNA encoding proteins having multiple deletions and substitutions relative to SEQ ID NO: 40, and DNA comprising "a part " of SEQ ID NO: 39 of claims 64-65, because even SEQ ID NO: 39 encoding SEQ ID NO: 40 has not been shown to have the desired activity since

it is a partial DNA sequence. Furthermore, the any "stringent" conditions of claim 66 are not expected to yield DNA sequences that are functionally and structurally related to SEQ ID NO: 39 because "stringent" varies from one laboratory to another. Consequently, Applicant has not described a representative number of DNA of the genus claimed. Since Applicant has not described the DNA as broadly claimed, vectors, host cells and plant cells/ plant/progeny comprising said DNA, and a method of using said DNA are similarly not described.

Therefore, the claimed invention does not meet the current written description requirements. See, also, the Written description Examination Guidelines published in Federal Registry/Vol. 66, No.4/Friday, January 5, 2001/Notices).

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8-12, 64-69, 111-118, 121-125 are rejected under 35 U.S.C. 102(b) as being anticipated or, in the alternative, under 35 U.S.C. 103(a) as obvious over Sheveleva et al (Plant Physiology (1997), vol. 115, pp. 1211-1219; Applicant's IDS).

The claims are broadly drawn to DNA obtained by specified process encoding proteins having the activity of improving environmental stress tolerance, including salt stress, high and low temperature stresses, drought stress, ozone stress, UV stress, radiation stress and osmotic stress. The claims are also drawn to said DNA isolated from plants including specific plant species. The claims are further drawn to DNA sequences that hybridizes to SEQ ID NO: 39, DNA encoding proteins with one or more amino acids deleted, substituted or added in SEQ ID NO: 40, vectors and host cells comprising said DNA sequences, and transgenic plants. The claims are also drawn to a method of using said DNA.

Sheveleva et al teach a DNA encoding a *myo-inositol-o- methyltransferase* (IMT) isolated from *Mesembryanthemum crystallinum*, and a method for transforming tobacco plant cells with said DNA under the control of a CaMV 35S in a plant transformation construct (see Methods and Materials, page 1212). Transformed tobacco cells were regenerated and grown to maturity. T4 progeny plants were tested for salt and water stress tolerance (see pages 1212-1213, Results). Applicant has not provided any structural limitation (such as % of identity) in claims 8-12 that would distinguish the claimed DNA from the prior art DNA. *In re Thorpe,* 227 USPQ 964, 966 (Fed. Cir. 1985), teaches that a product-by-process claim may be properly rejected over prior art teaching the same product produced by a different process, if the process of making the

product fails to distinguish the two products. The DNA of claims 65-66 also read the prior art DNA, absent evidence to the contrary. Therefore, Sheveleva et al teach all claim limitations.

Accordingly the burden shifts to Applicant to provide evidence that the prior art invention would neither anticipate nor render obvious the claimed invention.

Claims 8-12, 64-69, 111-118, and 121-125 are rejected under 35 U.S.C. 102(b) as being anticipated or, in the alternative, under 35 U.S.C. 103(a) as obvious over Xu et al (Plant Physiology (1996) 110:249-257, Applicant's IDS).

Xu et al teach an isolated late embryogenesis abundant protein gene isolated from barley (HVA1), said gene confers tolerance to water deficit and salt stress in transgenic plants. Xu et al teach transforming rice cells with a vector comprising HVA1 gene operably linked to a rice actin 1 promoter, and transgenic rice plants having improved tolerance to water deficit and salt stress conditions (see page 250, Methods and materials). Zu et al also teach seed and second generation transgenic rice plants having improved water deficit and salt stress tolerance (Results, pages 251-254). Applicant has not provided any structural limitation (such as % of identity) in claims 8-12 that would distinguish the claimed DNA from the prior art DNA. *In re Thorpe,* 227 USPQ 964, 966 (Fed. Cir. 1985), teaches that a product-by-process claim may be properly rejected over prior art teaching the same product produced by a different process, if the process of making the product fails to distinguish the two products. The DNA of claims

65-66 also read the prior art DNA, absent evidence to the contrary. Therefore, Xu et al teach all claim limitations.

Remarks

No claim is allowed.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Medina A. Ibrahim whose telephone number is (571) 272-0797. The Examiner can normally be reached Monday -Thursday from 8:00AM to 5:30PM and every other Friday from 9:00AM to 5:00 PM. Before and after final responses should be directed to fax nos. (703) 872-9306 and (703) 872-9307, respectively.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Dr. Amy Nelson, can be reached at (571) 272-0804.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

9/14/04
Mai

MEDINA A. IBRAHIM
PATENT EXAMINER

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